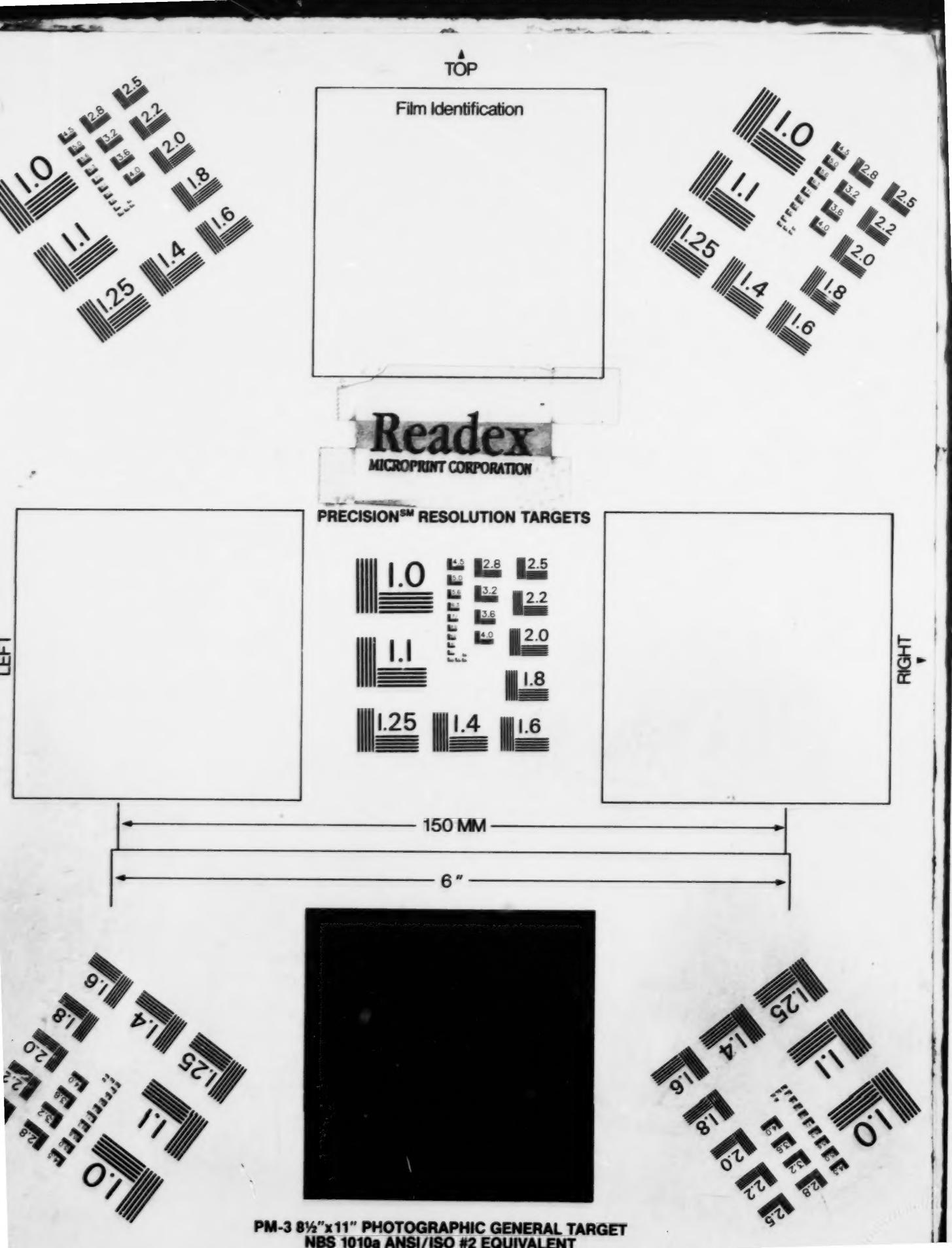
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GENERAL

ST/SG/AC.10/C.3/1997/16
23 April 1997

Original: ENGLISH

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Thirteenth session,
Geneva, 7-17 July 1997,
agenda item (3 (a))

DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Tanks

Portable tanks - A rationalized approach to assigning requirements to substances of Classes 3 to 9

Transmitted by the Expert from the United States of America

1. At the nineteenth session of the Committee the expert from the United States agreed to take account of comments provided by the International Maritime Organization (IMO) with respect to the rationalized approach for assigning portable tank requirements to substances of Classes 3 to 9. This document incorporates the IMO proposals into the rationalized approach provided in ST/SG/AC.10/C.3/24/Add.1. The text of the rationalized approach was also amended to take into account the reformatted text in the tenth revised edition of the UN Recommendations.

Proposals

2. The Sub-Committee is requested to approve the revised rationalized approach provided in Annex. The rationalized approach may need to be amended further to take into account revised portable tank requirements for Division 6.1 toxic by inhalation substances based on proposals from the expert from the United States. Once finalized the rationalized approach should be retained as a permanent reference document.

3. The expert from the United States proposes that the rationalized approach be applied to all substances in assigning portable tank instructions and special provisions in columns 10 and 11 of the Dangerous Goods List. If the Sub-Committee agrees with this proposal, grandfather provisions may need to be considered for some substances to allow continued use under existing portable tank assignments. In addition, the portable tank instructions (T notes) should be renumbered. The expert from the United States is prepared to develop a proposal addressing the grandfather provisions, renumbering the T notes and to assist the Secretariat in amending columns 10 and 11 of the Dangerous Goods List.

Amendments to Portable Tank Special Provisions:

4. On the basis of the previous proposal in ST/SG/AC.10/C.3/24/Add.1 to streamline the portable tank special provisions and comments provided by IMO, it is proposed that TP 5, 6, 11, 13, 14 and 15 be deleted from the list of portable tank special provisions in paragraph 4.2.4.3 and removed from the Dangerous Goods List. If this is agreed, the remaining portable tank special provisions should be renumbered and the Dangerous Goods List should be amended accordingly.

ANNEX

GUIDELINES FOR ASSIGNING PORTABLE TANK REQUIREMENTS TO SUBSTANCES IN CLASSES 3 TO 9

1. These guidelines for assigning portable tank requirements to substances in Classes 3 to 9 are provided as a reference to be used for assigning portable tank requirements to specific substances. The guidelines were developed taking into consideration the hazards of dangerous goods and their physical and chemical characteristics.

2. The guidelines provide guidance for assigning specific requirements including minimum test pressures, minimum shell thicknesses, pressure-relief device arrangements and bottom opening closure requirements for portable tanks used to transport substances in Classes 3 to 9.

3. For certain substances the tank requirements recommended by these guidelines may not be appropriate owing to unique characteristics of the substance not addressed in these guidelines. In these instances expert judgement should be applied in assigning appropriate requirements.

4. The guidelines are provided in two parts. Part I provides general guidance. Part II provides specific guidance for groups of substances organized on the basis of the Class or Division, Packing Group and subsidiary risk.

Part I General Guidelines:

5. In assigning tank requirements to a substance the following should be taken into account:

5.1 **Prohibited Substances**: Some substances should be prohibited from transport in portable tanks. These substances are considered too dangerous for transport typically because of their instability or because they pose an unacceptably high level of risk when transported in bulk quantities under normal conditions of transport. The following substances are prohibited from transport in portable tanks:

- Substances of Class 1;
- Desensitised explosives in Division 4.1;
- Self-reactive substances (other than type F) and related substances of Division 4.1;
- Organic peroxides of Division 5.2 other than Type F;
- Radioactive materials other than Low Specific Activity (LSA) non-fissile or fissile excepted materials.

Additional substances as specifically identified in the Recommendations. Furthermore, some substances may only be transported on the basis of an approval by the competent authority.

5.2 **Minimum Shell Thicknesses:** The minimum shell thicknesses prescribed are provided in thicknesses relevant to reference steel with a guaranteed minimum tensile strength of 370 N/mm^2 and a guaranteed minimum elongation of 27%. When other materials are used equivalent thickness calculations should be performed. Minimum thicknesses range from 5 mm to 10 mm. Part II of the guidelines provide guidance for assigning minimum thicknesses. Granular or powdered solid substances of PG II or III may be transported in tanks with minimum shell thicknesses of 5 mm in the reference steel regardless of the tank diameter when 6.6.2.4.2 is specified relevant to a given substance. Regardless of the minimum thickness specified in Part II, if the thickness determined in accordance with the provisions of sections 6.6.2.4 is greater, the greater thickness shall be applied.

5.3 **Corrosive Effects of Substances on Materials of Construction**: The minimum thicknesses prescribed do not take a substance's corrosive effects into account. The consignor must ensure that the tank materials of construction are compatible with the lading.

5.4 **Minimum Test Pressures**: Irrespective of the pressure assigned in these guidelines, the minimum test pressure assigned to an individual substance should be the greater of the pressure determined on the basis of the definitions in 6.6.2.1 of the Recommendations and the pressure assigned in these guidelines.

5.5 **Pressure-Relief Devices Requirements**: Two pressure relief device requirements are possible, (1) Normal (N) (where the provisions of paragraph 6.6.2.8.1 apply) or (2) 6.6.2.8.3. When paragraph 6.6.2.8.3 is referenced, a frangible disk must be provided in series preceding the pressure relief device. Paragraph 6.6.2.8.3 should be assigned to substances that:

- have the potential to polymerize or to produce solid or highly viscous substances capable of preventing proper operation of the relief valve.

In addition, 6.6.2.8.3 is also specified for individual substances as specified in the dangerous goods list based on the decisions of the Committee of Experts.

5.6 **Bottom Openings**: Three possible bottom opening arrangements are proposed, 6.6.2.6.3 (which indicates three serially mounted means of closure), 6.6.2.6.2 (two serially mounted means of closure) or NA (Not Allowed).

5.7 **Filling Limits**: Three different filling restrictions are possible. The filling limits are considered operational requirements. The filling limits do not have a direct relationship to the construction of the tank or the arrangement of the service equipment. On this basis, filling limits are not addressed in Part II of this Annex and will not be included in the tank type designations. The maximum filling limit for a substance should be consistent with the provisions under "Filling" in Chapter 4.2 of the Model Regulations. The shipper of the dangerous goods has the ultimate responsibility for assuring portable tanks are not filled in excess of the specified limits for each substance, solution or mixture transported.

Part II - Specific Guidelines for Assigning Portable Tank Requirements to Groups of Substances:

6.0 In assigning tank requirements to a substance the following should be taken into account:

6.1 For substances in CLASS 3, PG III without a subsidiary risk the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	1.5 bar*	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.2 For substances in CLASS 3, PG III with a Division 6.1 or a Class 8 subsidiary risk the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	2.65 bar*	6.6.2.4.2	Normal	6.6.2.6.3**

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.3a For substances in CLASS 3, PG II without subsidiary risks, the following requirements should apply:

Portable Tank Instruction	Minimum Test pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	2.65 bar*	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

6.3b For substances in CLASS 3, PG II with Division 6.1 or Class 8 subsidiary risks the following requirements should apply:

Portable Tank Instruction	Minimum Test pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4.0 bar*	6.6.2.4.2	Normal	6.6.2.6.3**

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.4 For substances in CLASS 3, PG I, substances in CLASS 3, PG I with a Div. 6.1 PG II or III subsidiary risk and substances in CLASS 3, PG I with a Class 8 PG II or III subsidiary risk, the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	6 bar*	6.6.2.4.2	Normal**	6.6.2.6.3***

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

** Some substances in this category require 6.6.2.8.3.

*** Bottom openings are not allowed for substances highly corrosive to steel.

***Note**: For Class 3 PG I substances with subsidiary risks which are assigned to n.o.s. entries the guidelines in 6.5 shall be applied.*

6.5 For substances in CLASS 3, PG I with 6.1, PG I subsidiary risk, and substances in CLASS 3, PG I with Class 8, PG I subsidiary risk, the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	6 bar*	6 mm	6.6.2.8.3	NA

* A higher or lower minimum test pressure (4 bar minimum) may be used depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.6 The following requirements should apply for:
Flammable solids in Division 4.1, PG II and III, Solid substances in Division 4.2, PG II and III, Solid substances in Division 4.3, PG II and III, Solid substances in Division 5.1, PG II and III Solid substances in Division 6.1, PG II and III, Solid substances in Class 8, PG II and III Solid substances in Class 9, PG II and III

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	1.5 bar	6.6.2.4.2*	Normal	6.6.2.6.3**

*Granular or powdered solid substances of PG II or III may be transported in tanks with minimum shell thicknesses of 5 mm in the reference steel regardless of the tank diameter.
**Some solid, highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

6.7 For liquid substances in DIVISION 4.2, PG I the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	10 bar	10 mm	Normal	NA

6.8 For substances in DIVISION 4.3, PG I with or without subsidiary risks the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6 mm	Normal	NA

***Note**: There are exceptions where more stringent requirements (minimum test pressure and minimum shell thickness) have been applied on the basis of industry practice (e.g. Metal Alkylls).*

6.9 For solutions of solid oxidizers in DIVISION 5.1, PG II and III, the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	2.65	6.6.2.4.2	Normal	6.6.2.6.3

6.10 For substances in DIVISION 5.1, PG II (hydrogen peroxides solutions) with a subsidiary risk of Class 8 the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6.6.2.4.2	Normal*	6.6.2.6.3**

* Certain substances require a breathing device.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.11 For substances in DIVISION 5.1, PG I with subsidiary risk of Class 8 the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6 mm	6.6.2.8.3	NA

6.12 For substances in DIVISION 5.1, PG I with a Class 8 and a Division 6.1 subsidiary risk the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	10 bar	10 mm	6.6.2.8.3	NA

6.13 For substances in DIVISION 5.2, PG II (Type F Organic Peroxides) the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6.6.2.4.2	6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	6.6.2.6.3

Note: Organic peroxides, Type F are only permitted in portable tanks when they are listed in Portable Tank Instruction [T 34]. All others are prohibited unless approved by the competent authority.

6.14 For liquid substances in DIVISION 6.1 PG III the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	2.65 bar*	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be used depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.15 For liquid substances in DIVISION 6.1 PG II with or without subsidiary risks the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar*	6.6.2.4.2	Normal	6.6.2.6.3**

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.16 For substances in DIVISION 6.1 PG I (non-inhalation hazard) with or without subsidiary risks the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	6 bar*	6 mm	6.6.2.8.3	NA

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

Note: Higher minimum test pressure and higher minimum thickness requirements should be considered for Division 6.1 substances that are classified as toxic on the basis of an inhalation hazard at the PG I level.

6.17 Class 7 assignments are not dealt with in this document.

6.18 For liquid substances in CLASS 8 PG III the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	2.65 bar*	6.6.2.4.2	Normal	6.6.2.6.3**

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.19 For liquid substances in CLASS 8 PG II with or without a subsidiary risk the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

** Bottom openings are not allowed for substances highly corrosive to steel.

6.20 For liquid substances in CLASS 8 PG I with or without a subsidiary risk the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	4 bar	6 mm	6.6.2.8.3	NA

6.21 For liquid substances in CLASS 9, the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	1.5 bar*	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.22 For Molten Substances and elevated temperature substances in Class 9 the following requirements should apply:

Portable Tank Instruction	Minimum Test Pressure	Minimum Shell Thickness	Pressure Relief Device	Bottom Openings
	1.5 bar*	6.6.2.4.2	Normal	6.6.2.6.3

* A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

***Note**: Assignments for molten substances in classes other than Class 9 should be assigned based on the requirements established for the particular class, division, packing group and subsidiary risk of the substance.*